Claims

[c1] 1. A method of preventing cathode break in an active matrix organic light emitting diode device, comprising the steps of:
providing a substrate, wherein the substrate has an array of thin film transistors and each thin film transistor further includes a gate electrode, a channel layer, a source terminal and a drain terminal;
forming a passivation layer over the substrate covering the thin film transistors;
planarizing the passivation layer;
forming an opening in the passivation layer that exposes the drain terminal;
forming an anode layer over the passivation layer and the interior of a portion the opening;
forming a light emitting layer over the substrate covering the anode layer; and
forming a cathode layer over the light emitting layer.

[c2] 2. The method of claim 1, wherein material constituting the passivation layer includes dielectric resin.

[c3] 3. The method of claim 1, wherein material constituting the anode layer includes indium-tin-oxide.

[c4] 4. The method of claim 1, wherein material constituting the light emitting layer includes an organic compound capable of emitting light.

[c5] 5. A method of preventing cathode break in an active matrix organic light emitting diode device, comprising the steps of:
providing a substrate, wherein the substrate has an array of thin film transistors and each thin film transistor further includes a gate electrode, a channel layer, a source terminal and a drain terminal, and the anode layer and the source terminal are electrically connected;
forming a patterned passivation layer over the substrate covering the thin film transistors but exposing a portion of the anode layer;
forming a patterned photosensitive layer over the substrate, covering the passivation layer and smoothing out the upper surface of the passivation layer;
forming a light emitting layer over the photosensitive layer and the anode layer; and

forming a cathode layer over the light emitting layer.

[c6] 6. The method of claim 5, wherein material constituting the passivation layer includes silicon nitride.

[c7] 7. The method of claim 5, wherein the same photomask is used for patterning the photosensitive layer and the passivation layer.

[c8] 8. The method of claim 5, wherein material constituting the anode layer includes indium-tin-oxide.

[c9] 9. The method of claim 5, wherein material constituting the light emitting layer includes an organic compound capable of emitting light.

[c10] 10. A method of preventing cathode break in an active matrix organic light emitting diode device through a process of rounding the corners of the source/drain terminal of a thin film transistor, the method comprising the steps of:

forming a conductive layer over the substrate;

forming a patterned photoresist layer over the conductive layer;

conducting a dry etching operation using the photoresist layer as an etching mask to form the source/drain pattern of the thin film transistor, wherein the source/drain pattern has a sloping profile at each end; and

removing the photoresist layer.

[c11] 11. The method of claim 10, wherein the gaseous reactant used in the dry etching operation is a gaseous mixture of SF_6 and O_2 and that the SF_6/O_2 ratio is between 0.5~1.0.

[c12] 12. The method of claim 10, wherein the gaseous reactant used in the dry etching operation is a gaseous mixture of $C/_2$ and $BC/_3$ and the $C/_2$ / $BC/_3$ ratio is between 0.4~0.8.

[c13] 13. The method of claim 10, wherein the conductive layer is a titanium/aluminum/titanium composite layer.

[c14] 14. The method of claim 10, wherein the conductive layer is made of

molybdenum.

[c15] 15. A method of preventing cathode break in an active matrix organic light emitting diode device through a process of rounding the corners of the source/drain terminal of a thin film transistor, the method comprising the steps of:

forming a conductive layer over the substrate; and

conducting an etching operation to form the source/drain pattern of the thin film transistor, wherein the source/drain pattern has a sloping profile at each end.

[c16] 16. The method of claim 15, wherein the step of forming the source/drain pattern includes the sub-steps of:

forming a patterned first photoresist layer over the conductive layer;

conducting a first etching operation using the first photoresist layer as an etching mask to remove a definite thickness of the conductive layer;

removing a definite thickness from the first photoresist layer to form a second photoresist layer; and

conducting a second etching operation using the second photoresist layer as an etching mask to form the source/drain pattern.

[c17] 17. The method of claim 16, wherein the step of removing a definite thickness of the first photoresist layer includes conducting an ashing operation using oxygen plasma.

[c18] 18. A method of preventing cathode break in an active matrix organic light emitting diode device through a process of rounding the corners of the source/drain terminal of a thin film transistor, the method comprising the steps of:

forming a conductive layer over the substrate; and

conducting an etching operation to form the source/drain pattern of the thin film transistor, wherein the etchant for the etching operation is $HNO_3/H_3PO_4/CH_3COO$, and the weight percentage of HNO_3 in the etchant is between 0.1~0.2.

[c19] 19. A method of preventing cathode break in an active matrix organic light emitting diode device, comprising the steps of:

providing a substrate, wherein the substrate has an array of thin film transistors and each thin film transistor further includes a gate electrode, a channel layer, a source terminal and a drain terminal;

forming an anode layer over the substrate in positions corresponding to each thin film transistor, wherein the anode layer and the source terminal are electrically connected;

forming a light emitting layer and a cathode layer over the substrate covering the thin film transistors and the anode layer; and

forming a repair conductive layer over the cathode layer to repair a broken cathode layer.

[c20] 20. The method of claim 19, wherein the repair conductive layer is formed by conducting a sputtering process.

[c21] 21. The method of claim 19, wherein the repair conductive layer is formed by conducting an evaporation-deposition process before a sputtering process.

[c22] 22. The method of claim 19, wherein the repair conductive layer is formed by conducting an electron beam evaporation-deposition process before a sputtering process.

[c23] 23. The method of claim 19, wherein the repair conductive layer and the anode layer are made from the same material.

Figures